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General Cargo Sea Transportation Costs

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and

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THE PROBLEM of improving the maritime transportation of general cargo is an important one to the economy of our country and to defense. In recognition of this fact the U. S. Departments of Commerce and Defense requested the National Academy of Sciences–National Research Council to undertake a research program in this field. This request was accepted in the fall of 1953 and the Maritime Cargo Transportation Conference, actually a continuing committee, was set up under the Divisions of Engineering and Physical Sciences to carry on the research (*see* NEWS REPORT Vol. II, pp. 86–87, 1952, and Vol. IV, pp. 5–6, 1954). Following the usual Academy–Research Council method, a committee, or Board of Advisors as it is called, was appointed to guide the work of a small full-time professional staff.

Surprise is sometimes expressed that the Academy–Research Council should be engaged in what might be assumed to be industrial engineering. Actually this approach to the project is a form of research

which, with its supporting courses of action, is directly in line with the duties of the National Research Council as set forth in its founding Executive Order.

In the first year of research some interesting facts were developed. It became apparent that the heaviest costs of transporting general mixed cargo overseas are concentrated in the operations where bulk is broken and additional labor is employed. A detailed analysis of a typical export transportation system clearly illustrated this.

The staff of the Conference made this study as a first step toward carrying out its mission of reducing the turn-around time of ships. Before it could undertake consideration of possible improvements in the conventional system, it was necessary to become familiar with the way an actual system worked. Other objectives of the study were to describe the entire system in operation in terms of its component parts, evaluate each segment of the system in terms of dollar, time, and manpower costs, and lastly to discover, if possible,

what segment or segments provided the most fruitful areas for further intensive investigation and corrective action.

The *S. S. Warrior*, a typical modern cargo vessel, was chosen as the vehicle for study because it was to load 5,000 long tons of mixed general cargo at a single United States port for complete discharge at one European port. Thus, it presented a fairly simple field of control for the staff. The cargo was to originate at hundreds of points in the United States and was to be delivered to multiple points in Europe. All phases of movement and handling were to be accomplished by commercial agencies. Lastly, because the operation was under the control of the Armed Forces, complete cooperation was offered to the staff and it was able to secure all pertinent documentation, an arrangement difficult to achieve in commercial operations.

With the aid of figures, some of the highlights of the *S. S. Warrior* study of the general cargo export system are described below.

Figure 1 represents the seven segments of the system. Segment I is the movement

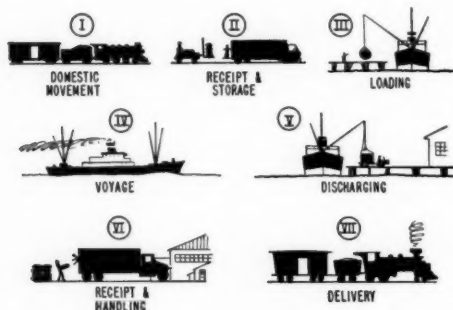


Figure 1.—The seven segments of the transportation system.

of the cargo from vendor to domestic port by all modes of transport. Segment II covers the operation of unloading the vehicle in the port, classification of cargo, and palletizing and laying down of cargo at point of rest on the pier. Segment III measures the movement of the palletized cargo from its point of rest on the pier to its being stowed and secured in the hold of

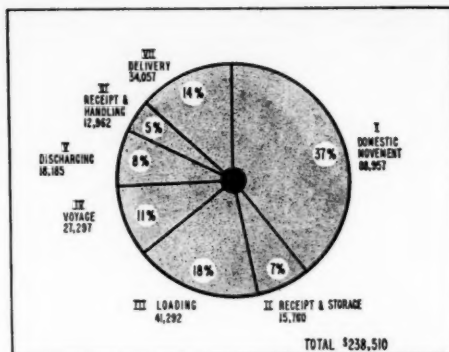


Figure 2.—Summary of dollar costs of transportation by segments.

the vessel. Segment IV measures the actual voyage from unberthing in New York to berthing in Bremerhaven, Germany. Segment V measures the operation of removing cargo from the hold of the vessel to its deposit on the quay. Segment VI describes the operation of removing cargo from the apron and loading into land transport vehicles. Segment VII is the movement of the loaded vehicle from the port to the unloading dock of the inland consignee.

Although the staff was primarily interested in the maritime features of the system, all seven segments were investigated with the thought that any system changes that might later be recommended in the purely maritime phases might well have repercussions on the purely land transport phases. Furthermore, the export system must be considered as a whole because it is composed of mutually dependent phases each having some effect on all the others.

The dollar, time, and manpower investments required to move these 5,000 long tons of cargo from domestic origins to foreign consignees through the entire system can now be shown. The pie chart in figure 2 shows that the total cost for the movement was \$238,000 or almost \$50 per long ton. You will note that the first and seventh segments, that is domestic transport in the United States and the delivery phase in Europe, comprise 51 percent of the total cost. If we look at the other five

segments which compose the maritime segments of the system, it is clear that loading with 18 percent of the total system costs, is by far the most expensive; and loading plus receipt and intransit storage at the domestic port comprise a little over one half of the total maritime segment dollar costs. So much for money.

Next let us consider the time factors. The total length of each time-bar in figure 3 represents the total elapsed time required to accomplish the mission of each segment. The shaded portion within each bar represents the weighted average time for the accomplishment of the function involved. The lowest bar shows us that the elapsed

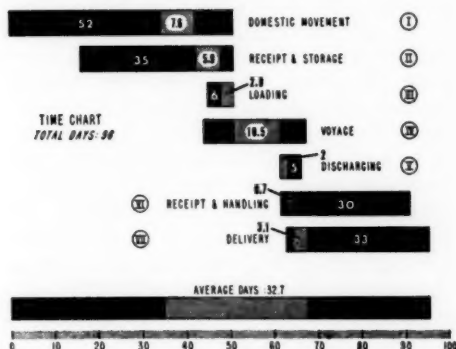


Figure 3.—Time chart showing elapsed times and weighted average times required for each segment.

time, measured from the day the first shipment left a depot or warehouse for New York until the day the last shipment was delivered to the consignee in Europe, totaled 97 days. The weighted average time for the system was 23.7 days. Looking at weighted time only, the greatest investment naturally is in the voyage with 10.5 days, the second longest investment is in domestic transport with 7.6 days. It is of interest to note that while loading time was only 2.9 days, loading plus receipt and storage time, that is just time consumed within the domestic port, was 8.8 days, or only about two days less than the time required to move the cargo a distance of 4,240 statute miles from New York to Bremerhaven.

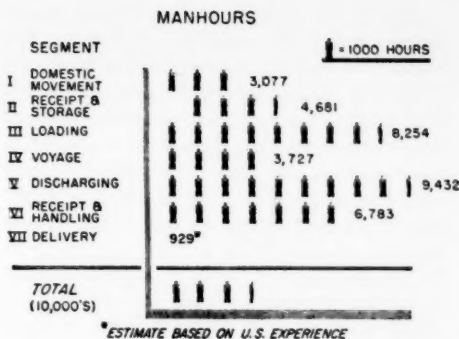


Figure 4.—Manpower investment in each segment.

The manpower investment is presented in figure 4. This shows that 37,000 man-hours of labor were required to move the block of 5,000 long tons from origin to destination. The greatest investment of labor occurred in Bremerhaven. The impressive point in this chart seems to be that within the domestic and foreign port terminals alone we invested 80 percent of the labor manpower used in moving this block of cargo through the entire transport system.

In figure 5 we analyze the maritime segments of the system, the staff's special field of interest. We see that the loading costs the most in dollars, the voyage costs the most in time, and discharging in Germany costs the most in manpower, but the latter value is closely followed by the labor investment in the New York port.

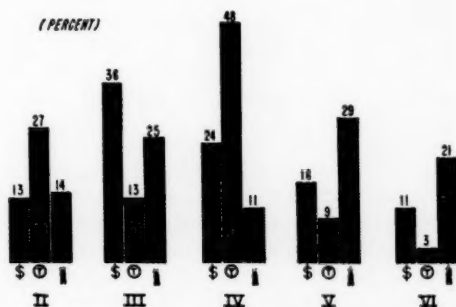


Figure 5.—Comparison of maritime segments by dollars, time, and manpower.

Figure 6 compares the labor investments among the maritime segments. The bottom of the figure shows that the total labor bill amounted to 48 percent of the total cost of the segment functions. Receipt and storage in the United States port is highest with 74 percent of the segment cost, followed closely by loading with 60 percent of that segment's cost. This shows, at least, that there is a great dependence in the maritime system on human muscle to process and move export cargo.

The various costs in the whole system arise from two types of functions which

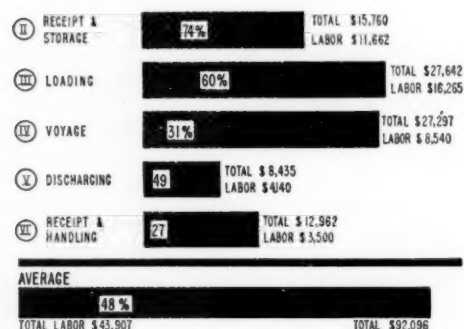


Figure 6.—Comparison of labor costs to total costs of maritime segments.

cannot be logically compared with each other. The first type deals with the significant forward movement of the cargo. The second is concerned with the processes by which cargo is sorted or transferred from one mode of transport to another with no real advance of the cargo toward its destination being accomplished. The staff, therefore, derived comparative measurements of performance for each group separately. The comparative measures of performance, expressed in dollar-day units

using long ton miles for the movement group and long tons processed for the process group, are as follows:

Movement segments:

| | |
|---------------------------|---|
| | <i>Dollar days per long ton mile (\$ × days ÷ long ton miles)</i> |
| I. Domestic movement..... | 0.509 |
| IV. Voyage | 0.013 |
| VII. Delivery | 0.063 |

Process segments:

| | |
|-------------------------------|--|
| | <i>Dollar days per long ton (\$ × days ÷ long ton)</i> |
| II. Receipt and storage..... | 19.82 |
| III. Loading | 23.78 |
| V. Discharging | 7.25 |
| VI. Receipt and handling..... | 1.80 |

It is clear that among the process segments loading with 23.78 units is by far the most costly phase, followed closely by receipt and storage. These two segments represent the entire activity of the domestic loading port. In the movement group, the voyage appears to be relatively efficient.

As a result of these comparisons it is evident that among the maritime segments in which the staff has primary interest, the receipt and storage segment and the loading segment in the domestic port represent the most fruitful area for significant improvement.

In summary, the S. S. *Warrior* study was designed in part to identify areas susceptible to significant improvement. It appears that a great deal of the investment in men, money, and time arises from activities associated with the frequent breaking of bulk throughout the system. From the analysis, it is evident that the domestic port activity and particularly the loading function, present the most inviting targets for further research. Accordingly, it is in these areas that future effort is most likely to be successful.

Institute of Animal Resources

BERTON F. HILL

Executive Secretary, Institute of Animal Resources

THE INSTITUTE of Animal Resources of the National Academy of Sciences-National Research Council was established as a consequence of the acute problems of supply, standardization, and procurement of biological material for assaying, experimentation, and teaching. A Conference on Animal Procurement was called by Paul Weiss, Chairman of the Division of Biology and Agriculture, on July 10, 1952. Representatives of government, industry, and private foundations attended this initial consultation. Dr. Weiss sounded the keynote of the meeting when he stated: "We have had in our minds the rather confused state of the problem of animal supplies in biology for research, education, and testing, a state which is quite natural since biology only recently has gone through what we might call the industrial revolution. From a small workshop activity of individual craftsmen, it has become mass industry and along with this goes an increased number not only of workers but of materials."

During the conference, it was voted to request the Academy-Research Council to establish a committee to recommend appropriate measures for the systematic organization of the broad field of procurement and supply of animals for biological, medical, and agricultural research, assaying, and testing. The following points of reference defined the framework within which the committee was to operate:

- 1) A systematic animal supply program was urgently needed.
- 2) It should be conceived on a broad and long-range basis.
- 3) Specific needs should be served within its structure.
- 4) Advantage should be taken of existing organizations already serving the purposes of the committee, and the cooper-

ation of these groups should be enlisted; the formation of voluntary associations in special fields should be encouraged.

- 5) The Academy-Research Council should inaugurate implementation of the program.

In November 1952, the Committee on Animal Resources proposed the formation of an Institute of Animal Resources. This proposal was accepted by the Academy-Research Council and the services of Orson N. Eaton were obtained as Executive Secretary. Dr. Eaton previously had been a geneticist with the U. S. Bureau of Animal Industry for many years. The Institute began full-time operation in July of 1953 with financial support from a few Government agencies. This base of support was later broadened to include contributions from private foundations and the pharmaceutical industry.

The primary efforts of the Institute were directed toward the compilation of a list of producers and users of laboratory animal stocks. Questionnaires were sent to all known breeders and users of animals, and from these questionnaires a file of producers, users, stocks, and characteristics was compiled.

Shortly after the inception of the Institute, the following committees were established to compile and evaluate information in specialized areas:

The *Genetics Committee* is interested in determining the genetic constitution of laboratory animals through inquiries of producers. In addition, they have begun a program of breeder education, using a series of pamphlets designed to indicate systems of mating and their genetic consequences. In the future, this committee may attempt to set standards of genetic definition for certain species, with the voluntary cooperation of breeders' associations.

The *Parasitism Committee* has the task of describing the various diseases of laboratory animals. Methods of diagnosis and control are included in this study.

The *Committee on the Procurement of Animals from Nature* is interested in determining what wild animals are used in research. In addition, the committee is concerned with the problem of finding new animals in nature which would be of value for specific research.

The *Nutrition Committee* emphasizes the role of adequate nutrition for laboratory animals and hopes to be able to give guidance to both the breeder and user of animals on stock diets. The question of protein availability in diets and the problem of chemical additives in animal food-stuffs concern this group.

The *Handbook and Information Committee* is engaged in the dissemination of information on laboratory animal stocks and their uses. One of its main duties entails the general supervision of publications of the Institute.

A major consequence of the survey of animal stocks in the United States and the efforts of various Institute committees has been the publication of the "Handbook of Laboratory Animals" in October 1954. This 77-page book is a valuable addition to the reference works of both producers and users of animal material. Within the handbook are two major lists: the first, a compilation of nearly 170 citations to sources of supply for mice, rats, guinea pigs, rabbits, hamsters, dogs, monkeys, pigeons, chickens and chick embryos, amphibians, reptiles, arthropods, protozoans, and many other forms procured from the wild; and the second, a table containing the names of users of various forms of biological material in research, assaying, and testing. In addition, there are brief accounts of diseases of nine species, a few pages devoted to the uses of laboratory animals, and a section of general and specific references. It is conceived that the handbook will undergo continuous revision with the addition of pertinent topics and the correction of old material.

During the past year, the Institute has dealt with a variety of problems in the field of animal resources. Many requests for information concerning supply, housing, diseases, breeding, and uses have been received and have been answered by the staff or by consultants. Consideration is being given to the support of especially valuable rodent strains which, while not being utilized at the moment, may be of scientific value later. The collection of a bibliography on the uses of biological material is a continuing process. The problem of the rhesus monkey supply led the Institute to sponsor a conference on this subject on June 7. A survey was conducted to obtain information about the condition in which transported animals are received by the investigator. This will provide a framework for action by the Institute. Animal bibliographies are being collected and disseminated to interested persons. The publication of a monograph on the diseases of wild birds and mammals is being supported in part by the Institute.

Looking to the future, the Institute can outline some of the problems with which it will be confronted. A revision of the "Handbook of Laboratory Animals" will be forthcoming by the end of 1955. The format of this book will be based on the idea that the Institute should continually revise and add to the material contained in it. Plans for treatises on laboratory animal diseases as separate publications are going forward. A program of breeder education for the betterment of animal stocks will be carried out. A plan of accreditation for the raisers of certain stocks, such as that now in effect in Great Britain, may be pursued as a joint effort of the Institute and the breeding associations. The facilitation of the international exchange of animal stocks and information will be considered perhaps as a joint venture with the International Union of Biological Sciences.

The united action of all groups concerned in the procurement, distribution, and use of biological material may well assist the research scientist in his continuing quest for knowledge.

SCIENCE NEWS

AUTUMN MEETING NATIONAL ACADEMY OF SCIENCES

The autumn meeting of the National Academy of Sciences will be held at the California Institute of Technology, Pasadena, Calif., November 2-4. Five half-day sessions will be devoted to the presentation of scientific papers. The business meeting of the Academy for members only has been scheduled for Wednesday afternoon, November 2. The customary public lecture will be given on Wednesday evening.

Carl Niemann, Professor of Organic Chemistry at California Institute of Technology, is Chairman of the Committee on Arrangements. Charles C. Lauritsen and Alfred H. Sturtevant also at California Institute of Technology together with Paul W. Merrill, Astronomer at Mt. Wilson and Palomar Observatories, are the other members of the Committee. Detlev W. Bronk, President of the Academy, and Hugh L. Dryden, Home Secretary, are *ex officio* members.

INTERNATIONAL CONFERENCE ON THE USE OF ANTIBIOTICS IN AGRICULTURE

The Academy-Research Council through its Agricultural Research Institute and with the financial support of the American Cyanamid Company, Merck & Company, Charles Pfizer & Company, Inc., and E. R. Squibb & Sons is sponsoring an International Conference on the Use of Antibiotics in Agriculture, both animal and plant, to be held in Washington, October 19-21.

Invitations to participate in the conference have been extended to 16 scientists in 13 foreign countries and to 28 in the United States. The following foreign participants are planning to attend:

H. D. BRANION, Department of Nutrition, Ontario Agricultural College, Guelph, Canada

KNUT BREIREM, Institute of Animal Husbandry and Animal Breeding, Agricultural College of Norway, Vollebekk, Norway

JOHANNES BRUEGGEMANN, Institute of Physiology and Animal Nutrition, University of Munich, Munich, Germany

HJALMAR CLAUSEN, National Research Institute for Animal Husbandry, Copenhagen, Denmark

DOUGLAS COLES, Director of Veterinary Service, P. O. Onderstepoort, Union of South Africa

JOHN DUCKWORTH, Biochemistry Department, Rowett Research Institute, Bucksburn, Aberdeenshire, Scotland

SVEN DYREDAHL, Royal Veterinary College, Stockholm, Sweden

ANDRÉ C. FRANÇOIS, Centre National De Recherches Zootechniques, Domaine de Vilvert, Jouy en Josas, Seine et Oise, France

E. FREERKSEN, Institute for Experimental Biology and Medicine, Borstel über Bad Oldesloe, Germany

W. S. GORDON, Agricultural Research Council, Field Station, Compton, near Newbury, Berks, England

S. K. KON, National Institute for Research in Dairying, Shinfield, near Reading, Berks, England

H. R. MARSTON, Chief of Division, Commonwealth Scientific and Industrial Research Organization, University of Adelaide, Adelaide, South Australia

FRANCISCO RUIZ-SANCHEZ, Instituto de Patología Infecciosa Experimental, Universidad de Guadalajara, Guadalajara, Jalisco, Mexico

A. DE JUANA (SARDON), State Animal Health Center, Madrid, Spain

R. L. SQUIBB, Servicio Cooperativo Interamericano de Agricultura, "La Aurora" Guatemala, Departamento de Zootecnia, Guatemala

H. L. A. TARR, Acting Director, Pacific Fisheries Experimental Station, Vancouver 2, B. C., Canada.

Howard I. Cole, Conference Secretary, is in charge of arrangements and Ted Byerly, Agricultural Research Center at Beltsville, Md., is Chairman of the Academy-Research Council Committee which is planning the program for the conference.

Dr. Byerly anticipates that this conference will bring worldwide information on the impact of antibiotics in the field of animal nutrition and food production up to date. The conference will concern itself primarily with the effects of antibiotics upon plants and animals which provide our food.

The Agricultural Research Service of the Department of Agriculture is cooperating in the entire project, and the Honorable Ezra Taft Benson, Secretary of Agriculture, will greet the participants on Tuesday, October 18. The technical session will begin on the 19th.

In addition to a local field trip to the Agricultural Research Center at Beltsville, Md., the cooperating companies will sponsor a series of field trips for the visiting scientists to the Pfizer Experimental Farm at Terre Haute, Ind.; Purdue University; the Utilization Research Laboratory of the U. S. Department of Agriculture at Peoria, Ill.; and to the American Cyanamid, Merck, and Squibb laboratories in New Jersey and New York.

INTERNATIONAL GEOPHYSICAL YEAR

Delegates from 30 nations participating in the International Geophysical Year (IGY) met in Brussels, September 8-14. The meeting was the third assembly of the Comité Spécial de l'Année Géophysique Internationale (CSAGI) established by the International Council of Scientific Unions to integrate the technical efforts of the participating nations, now totaling 40.

The principal tasks before the assembly were the review of technical programs as established at the Rome meeting one year ago, the formulation of plans for technical operational manuals in each discipline, the establishment of criteria for data interchange, and the development of initial plans for data publication. In view of the nature of the problems before the assembly, working groups were set up in the various IGY fields of interest: meteorology, geomagnetism, aurora and airglow, ionospheric physics, solar activity, longitudes and latitudes, glaciology, oceanography, rocketry and satellites, cosmic rays, seismology, gravity measurements, and world days. In addition special regional groups were established for the Antarctic, Arctic, and Equatorial regions as well as for the principal meridional lines of pole-to-pole stations (10° and 140° east, and 70°/80° west) and for an additional line (110° east). Working groups were also established for data interchange problems and for data publication.

Substantial progress was made in these deliberations, and the results of the various working groups met with unanimous approbation in the plenary approval sessions. The final results of the assembly are expected to be available from the CSAGI secretariat early in October. An assess-

ment of the results indicates that the decisions arrived at last year in Rome were confirmed. The program has grown, largely because several new participants have entered the program. The entry of the U.S.S.R. is perhaps most significant by virtue of the appreciable land mass involved. The Russian participation will provide valuable coverage of this large geographical area, and it appears that the Russian program is a very substantial one.

Approximately 200 representatives of various national committees and international bodies participated in the sessions. The delegation of the United States sent by the Academy-Research Council consisted of the following:

| | |
|--------------------------------|-------------------|
| JOSEPH KAPLAN, <i>Chairman</i> | A. E. LOMBARD |
| HUGH ODISHAW, <i>Secretary</i> | M. G. MORGAN |
| J. N. ADKINS | WALTER MUNK |
| WALLACE W. ATWOOD, Jr. | H. E. NEWELL, Jr. |
| N. T. BOBROVNIKOFF | R. A. PRIOR |
| J. W. CHAMBERLAIN | R. R. REVELLE |
| A. P. CHARY | D. A. RICE |
| R. S. DIETZ | F. E. ROACH |
| GEORGE DUFEK | E. B. ROBERTS |
| C. T. ELVEY | G. P. RIGSBY |
| W. O. FIELD | A. H. SHAPLEY |
| N. C. GERSON | P. A. SIPLE |
| E. O. HULBURT | R. J. SLUTZ |
| C. O'D. ISELIN | E. H. SMITH |
| J. WALLACE JOYCE | W. G. STROUD |
| G. M. KAVANAGH | A. C. TRAKOWSKI |
| G. L. KETCHUM | HARRY WEXLER |
| W. W. KELLOGG | D. L. WOLF |
| D. F. LEIPFER | P. H. WYCKOFF |
| G. G. LILL | |

GEOGRAPHICAL FIELD RESEARCH IN FOREIGN AREAS

Recognizing that geography in America suffers because few American geographers are doing field research in foreign areas, the Academy-Research Council has initiated a program of support for young geographers to carry out field investigations abroad. Preference will be given to field projects involving at least six months' foreign residence. Support will be made available not only to geographers but also to scientists in related fields whose research topics are closely allied to geography. Financial support is provided by the U. S. Office of Naval Research. The Division of Earth Sciences is appointing a committee to screen all applications.

INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS

Lloyd V. Berkner, President of Associated Universities, Inc., and a member of the National Academy of Sciences, was elected President of the International Council of Scientific Unions (ICSU) at its Seventh General Assembly held at Oslo, August 9-12. Dr. Berkner has been active in the affairs of ICSU and its Unions for many years. At the present time he is Vice-President of the International Scientific Radio Union and Vice-President of the Special Committee for the International Geophysical Year. At the Oslo Assembly Dr. Berkner served as chairman of the United States delegation (*see* NEWS REPORT, Vol. V, No. 4, p. 61).

In addition to Dr. Berkner's election as President, other officers of ICSU elected or re-elected at the Oslo General Assembly are:

K. S. KRISHNAN (India), Vice-President
P. LEJAY (France), Vice-President
E. HERBAYS (Belgium), Treasurer
A. V. HILL (United Kingdom), Secretary General
B. LINDBLAD (Sweden), Retiring President
V. A. ENGELHARDT (U.S.S.R.), Elected Member of the Bureau
A. STOLL (Switzerland), Elected Member of the Bureau

An invitation for ICSU to meet in Washington, D. C., in 1958, extended by the United States delegation on behalf of the Academy-Research Council and the U. S. Government was accepted by the General Assembly. The dates for the meeting will be determined by the Bureau of ICSU in consultation with the President of the National Academy of Sciences.

Representatives of 11 scientific unions and 17 nations participated in the discussions at Oslo. Among the actions taken by the Assembly, the following may be of interest to readers of NEWS REPORT.

The General Assembly—

1) Voted to admit the International Union of Physiological Sciences and the International Union of Biochemistry as scientific members of ICSU.

2) Approved the fusion of the International Union of the History of Science and the International Union of Logic, Philosophy, and Methodology of Science and

accepted the new union thus formed as a scientific member of ICSU. The new union will be known as the International Union of History and Philosophy of Science.

3) Voted to admit the Union of Soviet Socialist Republics as a national member of ICSU. The Soviet Academy of Sciences will serve as the adhering organization.

4) Voted to increase the annual dues of national members. The new schedule of payments establishes six categories of membership and six units of subscription as follows:

| Category | Unit Subscription (U. S. \$) |
|----------|------------------------------|
| I | 20 |
| II | 40 |
| III | 80 |
| IV | 150 |
| V | 300 |
| VI | 600 |

Each national member of ICSU will be invited to select its own category and the amount of the subscription of each national member will be determined by multiplying the amount of the categorical unit by the number of unions to which the national member adheres. Thus, a national member which adheres to all 13 ICSU unions and selects category VI will pay an annual subscription of \$7,800.

5) Resolved that the members of ICSU be invited to undertake studies on the biological and other effects of nuclear radiations as a basis for the scientific assessment of their implications with respect to living organisms and, having been advised that the United Nations was contemplating moves for the clarification of issues relating to this problem, further resolved that ICSU *a)* offer its services to the United Nations in connection with the scientific aspects of such matters and *b)* establish a special committee to provide this assistance, to delineate the problems to be explored, and to coordinate and integrate the information resulting from such studies.

6) Requested the Bureau of ICSU to consider the appointment of a special committee to plan a symposium on the organization of international science to be held at the time of the Eighth General Assembly in 1958.

SOUTH PACIFIC COMMISSION RESEARCH COUNCIL

A principal activity of the Academy-Research Council's Pacific Science Board is associated with the development of the research program of the South Pacific Commission. Felix M. Keesing, anthropologist at Stanford University, and Knowles A. Ryerson of the College of Agriculture of the University of California at Berkeley, a member of the Board and its former Chairman, are the two U. S. Commissioners. Harold J. Coolidge, Executive Director of the Board, is one of the three U. S. Associate Members of the Commission's Research Council.

The seventh meeting of the Council was held at the Commission headquarters in Noumea, New Caledonia, June 20-July 1. United States participants, in addition to Mr. Coolidge, were John C. Cool, Samoan Affairs Officer, and J. E. Kennedy, Director of Medical Services for Guam.

The South Pacific Commission is an advisory and consultative body set up by six governments responsible for the administration of island territories in the South Pacific region. Its purpose is to recommend to the member governments means for promoting the well-being of the people of these territories. The implementation of the approved program is the responsibility of the Secretary-General of the Commission.

The Research Council, composed of national representatives appointed by the Commissioners of Australia, France, the Netherlands, New Zealand, the United Kingdom, and the United States, is an advisory body to the Commission. The Council reviews the long range program and recommends future activities.

Plans of the Commission include a 13-week fisheries training course at Noumea to be conducted with the assistance of the Food and Agriculture Organization, further study of the important problem of foreign plant introduction, and continued research on the rhinoceros beetle, a serious coconut pest. The latter research will deal with disease factors in wild beetle populations and will be carried out with the aid of a grant from the Rockefeller Foundation. Paul Surany of the Illinois State

Natural History Survey has been selected for this special 3-year assignment and will work in East Africa, India, and Southeast Asia, as well as the South Pacific.

In public health, the Commission continues its well defined program in the field of nutrition, assisted by a grant from the Williams-Waterman Fund. There is also active work on mosquito borne diseases, especially filariasis and malaria.

The permanent officers of the Research Council are: E. M. Ojala, Deputy Chairman; H. E. Maude, Executive Officer for Social Development; A. H. J. Kroon, Executive Officer for Economic Development; and E. Massal, Executive Officer for Health. The Secretary-General of the Commission is Ralph C. Bedell, on loan from the U. S. Department of Health, Education, and Welfare.

PAN AMERICAN INSTITUTE OF GEOGRAPHY AND HISTORY

The Sixth General Assembly of the Pan American Institute of Geography and History (PAIGH) was held from July 25 to August 6 in Mexico City. Approximately 150 delegates and official observers from countries other than Mexico attended. The United States sent some 50 delegates and official observers. The 21 American Republics and Canada were represented, as well as the Organization of American States and five of its specialized agencies. The Commissions on Cartography, Geography, and History met concurrently with the General Assembly of the Institute.

The General Assembly was devoted primarily to consideration of matters of policy and organization. Among the more important actions taken by the Assembly was the revision of the statutes of the Institute. This revision abolished the Executive Committee which consisted of the President, Vice President, and Chairmen of Commissions and established a Directing Council composed of the Chairmen (preferably) of the 21 National Sections. It also changed the status of the Secretary General from that of an employee appointed by the Executive Committee to an elected official chosen at each General Assembly for a 4-year period without reelection.

DISPOSAL OF RADIOACTIVE WASTES

At the request of the Atomic Energy Commission, the Academy-Research Council sponsored a conference to study the disposal of radioactive wastes in deep geologic structures, September 10-12, at the Graduate College, Princeton, N. J. About 60 scientists and engineers conferred on all feasible means of underground disposal and discussed what research should be undertaken to test the most promising methods.

In the general sessions specialists in waste disposal from the Atomic Energy Commission and the Department of Sanitary Engineering of Johns Hopkins University outlined the technical prerequisites. The working groups decided upon the basic requirements of safe underground disposal and considered numerous specific suggestions.

The conference concluded that safe and economical disposal of radioactive waste in geologic structures is possible and that sites worthy of detailed investigation are available in many parts of the United States. The individual investigations would, in turn, indicate what engineering research would be needed before a safe operating facility could be installed.

BUILDING RESEARCH ADVISORY BOARD

The Academy-Research Council has appointed Harold D. Hauf, Head of Department of Architecture, Rensselaer Polytechnic Institute, Chairman of the Building Research Advisory Board and A. N. Frederickson, Vice-President of Weyerhaeuser Sales Company, Vice-Chairman. Both Mr. Hauf and Mr. Frederickson have been members of the Advisory Board for three years. The Executive Committee, appointed at the same time, includes the following members in addition to the Chairman and Vice-Chairman:

EDMUND CLAXTON, Director of Research, Armstrong Cork Company

MASON C. PRICHARD, Executive Vice President, The Foundation Company

CHARLES H. TOPPING, Senior Architectural and Civil Consultant, E. I. du Pont de Nemours & Company, Inc.

RALPH WALKER, Member of Voorhees, Walker, Smith, and Smith

B. L. WOOD, Consultant in Engineering, American Iron and Steel Institute.

COMMITTEE ON CRITICAL TABLES

The Academy-Research Council has established a new Committee on Critical Tables, consisting of representatives of four divisions of the Research Council. The primary purpose of the Committee is to develop plans for and stimulate the preparation of critical tables to meet current needs originally filled by the International Critical Tables. The Committee on Tables of Constants and Numerical Data, operated within the Division of Chemistry and Chemical Technology with the cooperation of the Division of Physical Sciences, has been dissolved and its functions temporarily transferred to the new committee.

Membership of the Committee on Critical Tables includes the following:

A. V. ASTIN, National Bureau of Standards, *Chairman*

FRANCIS BIRCH, Harvard University, representing the Division of Earth Sciences

ROBERT B. BRODE, University of California, representing the Division of Physical Sciences

F. B. LLEWELLYN, Bell Telephone Laboratories, representing the Division of Engineering and Industrial Research

FREDERICK D. ROSSINI, Carnegie Institute of Technology, representing the Division of Chemistry and Chemical Technology.

The Committee plans to establish a large advisory board, consisting of representatives of various professional societies, industrial organizations and government agencies that are interested in the development and use of critical tables. The first meeting of the Committee is scheduled for early October.

HIGHWAY RESEARCH BOARD STUDY OF HIGHWAY LAW

At the request of the Executive Committee of the American Association of State Highway Officials, the Highway Research Board has initiated a comprehensive study aimed at attaining adequate highway laws so vitally needed in this country today.

In June 1951, the Committee on Highway Laws of the Board began an exploratory study, and for the past two years the work was conducted on a limited scale by a small staff provided on a loan basis. However, with the development of increased public understanding of the need for better highways and of broad support for a build-

ing program, the pressing need for accelerating the legal research was recognized, and four attorneys (*see below*) were employed to complete the survey within the estimated period of three years.

The objectives of this study undertaken by the Committee on Highway Laws are 1) to assemble and analyze state constitutions and statutes as they relate to all highway functions and 2) to isolate the important principles so that highway officials may determine those which are basic for adequate highway laws. Execution of the first objective also encompasses a complete analysis of pertinent court decisions and opinions of attorneys general. The second objective will be undertaken when this basic research is completed.

NATIONAL CLAY CONFERENCE

The Committee on Clay Minerals, a joint committee of the Divisions of Earth Sciences, Biology and Agriculture, and Chemistry and Chemical Technology, is organizing the Fourth National Clay Conference to be held October 10-13 at Pennsylvania State University. Judging by attendance at previous conferences, the local committee is planning for about 400 participants from United States and Canada.

The program will feature invited papers by a few distinguished European specialists and symposia on special topics of current interest in addition to the general sessions for technical presentations. The European scientists have been asked to deal especially with clay studies in their respective countries and have been invited to participate in the discussions. The following scientists from abroad are planning to attend:

J. M. ALBARADA, Madrid, Spain
W. DEKEYSER, Ghent, Belgium
S. HENIN, Paris, France
U. HOFMANN, Darmstadt, Germany
D. M. C. MACEWAN, now in Granada, Spain
T. SUDO, Tokyo, Japan
G. F. WALKER, Melbourne, Australia
J. WHITE, Sheffield, England.

The Proceedings of the Second National Clay Minerals Conference, held at Columbia, Mo., in October 1953 are now available from the Publications Office of the Academy-Research Council.

METAL CURTAIN WALLS CONFERENCE

The Building Research Institute conducted a Conference on Metal Curtain Walls on September 28 and 29 at the Academy-Research Council building. Edward X. Tuttle of Giffels & Vallet, Inc., Chairman of the Program Committee, also served as Conference Chairman. The Conference was sponsored by the Porcelain Enamel Institute and by seven member organizations of the Building Research Institute directly interested in products applicable to metal curtain walls.

The two-day program covered the following topics: Recent studies of metal curtain walls, architectural design, performance requirements in panel design, structural design techniques, panel insulation and condensation control, sound transmission, and erection of metal curtain walls. The proceedings of this conference will be published by the Building Research Institute.

STAFF APPOINTMENTS

The Library of the Academy-Research Council announces the appointment of **H. Lynn Womack** as an assistant staff member. Dr. Womack received his Ph.D. degree in philosophy from Johns Hopkins University in June 1955 and is a candidate for the Master's degree in Library Science at the Catholic University of America. In addition to his position with the Academy-Research Council, he is an Associate in Philosophy at The George Washington University. Dr. Womack was formerly Associate Librarian at Georgetown University.

The Highway Research Board has appointed **Mary O. Eastwood**, **Howard G. Feldman**, **Robert S. Plotkin**, and **Alfred J. Tighe, Jr.** staff members of the Committee on Highway Laws. These four attorneys are making a survey of state laws as they relate to highways.

Karl F. Heumann, Director of the Chemical-Biological Coordination Center for the past three years, has resigned to accept a position with Chemical Abstracts at Ohio State University in Columbus, Ohio.

The Academy-Research Council has appointed **George A. Livingston** Acting Director of the Chemical-Biological Coordination Center effective September 1. Dr. Livingston has been associated with the Center since June 1953. Before that he taught horticulture at Texas College of Arts and Industries.

The Materials Advisory Board announces the appointment of two staff metallurgists, **Joseph R. Lane** and **Clarence A. Wendel**. Dr. Lane, formerly Head of the High Temperature Alloys Branch of the Naval Research Laboratory, will devote his time to metallurgical problems involving columbium, tantalum, cobalt, and high temperature alloys. Mr. Wendel will make a survey

of the potential usage of precision castings in aircraft. Before coming to the Academy-Research Council, Mr. Wendel served as Special Consultant in the Office of Political Affairs of the American High Commission in Germany and prior to 1950 was in the Office of the Special Assistant for Atomic Energy to the Secretary of State.

The Division of Physical Sciences announces the appointment of **John L. Magee** as professional associate to the Weapons Systems Evaluation Group. Dr. Magee has served as a member of the Subcommittee on Radiobiology of the Committee on Nuclear Science and, before coming to the Academy-Research Council, taught chemistry at Notre Dame University.

FELLOWSHIP PROGRAMS

MEDICAL RESEARCH FELLOWSHIPS

The Division of Medical Sciences is accepting applications for postdoctoral research fellowships for 1956-57. These awards are designed to offer research experience for promising individuals who look forward to investigative careers and not to provide practical experience in the clinical fields. Ordinarily fellowships are not granted to persons over thirty-five years of age. The following programs are announced:

Fellowships in Cancer Research, awarded by the American Cancer Society upon recommendation of the Committee on Growth of the Division of Medical Sciences, are available for study in all branches of the biological, chemical, and physical sciences and of clinical investigation applicable to the study of growth, typical or malignant. Citizens of the United States are eligible.

British-American Exchange Fellowships in Cancer Research, awarded by the American Cancer Society upon recommendation by the Committee on Growth,

are offered to citizens of the United States for advanced study in Great Britain in specialized fields pertaining to the problem of growth. Similar fellowships are awarded by the British Empire Cancer Campaign to young British scientists for research in the United States.

Fellowships in the Medical Sciences, supported by the Rockefeller Foundation, are administered by the Medical Fellowship Board of the Division. Fellows are expected to devote themselves to research in the basic medical sciences. The awards are open to citizens of the United States and Canada.

Fellowships in Tuberculosis are also administered by the Medical Fellowship Board under a grant from the National Tuberculosis Association. These awards are designed to promote the development of investigators in fields related to tuberculosis. They are open to citizens of the United States who are graduates of American schools.

Fellowships in Radiological Research are administered for the James Picker

Foundation by the Division's Committee on Radiology. Applications may be submitted by candidates seeking to gain research skills leading to investigative careers in the field of radiology. Appointments are not limited to citizens of the United States.

Applications for 1956-57 under any of the above programs must be postmarked on or before December 1, 1955. Fellowships are awarded in the early spring. Complete details and application blanks may be obtained from the Fellowship Office, Academy-Research Council, 2101 Constitution Avenue, Washington 25, D. C.

CANCER RESEARCH SCHOLARS

The Committee on Growth of the Academy-Research Council, acting for the American Cancer Society, is accepting applications for grants for scholars in cancer research. The purpose of these grants is to assist institutions in the support of young scientists during the critical early period of their careers as independent investigators.

Applications are accepted from institutions only and the institution receives a 3-year grant of \$18,000 for each scholar selected. The grants may be renewed for an additional two years whenever such extension is considered desirable. Applications should be submitted by institutions on behalf of candidates before January 1, 1956.

Application blanks and additional information may be obtained from the Executive Secretary, Committee on Growth, Academy-Research Council, 2101 Constitution Avenue, Washington 25, D. C.

RADIOLOGICAL RESEARCH AWARDS

The Academy-Research Council, acting for the James Picker Foundation, announces the availability of funds for support of radiological research. The Division of Medical Sciences is accepting applications for grants-in-aid and for grants for scholars. Applications for the fiscal year 1956-57 must be received before December 1, 1955. Awards are not restricted to citizens of the United States.

Grants-in-aid of varying amounts are designed to encourage research which offers promise of improvement in radiological

methods of diagnosis or treatment of disease. The research worker applies for this type of award himself.

Grants for scholars are designed to bridge the gap between the completion of fellowship training and the period when the young scientist has demonstrated his competence as an independent investigator. A grant of \$6,000 per year is made directly to the scholar's institution as a contribution toward his support, or his research, or both. Initial grants are limited to one year, but renewal may be recommended. Application should be submitted by the institution on behalf of the candidate.

Application blanks and additional details may be obtained from the Division of Medical Sciences, Academy-Research Council, 2101 Constitution Avenue, Washington 25, D. C.

NATIONAL SCIENCE FOUNDATION FELLOWSHIPS

The Fellowship Office of the Academy-Research Council will again assist the National Science Foundation in administering its fellowship program by accepting applications for the 1956-57 academic year and by having a review panel screen the applications and recommend candidates to the National Science Foundation for final selection.

The Foundation plans to award approximately 700 graduate and 80 postdoctoral fellowships in the mathematical, physical, medical, biological, and engineering sciences, including anthropology, geography, psychology (excluding clinical psychology) and in certain inter-disciplinary fields and fields of convergence between the natural and social sciences. These fellowships will be open only to citizens of the United States.

Applications for the graduate fellowships must be received in the Fellowship Office by January 3, 1956; applications for postdoctoral fellowships must be received by December 19, 1955.

Additional information and application blanks may be obtained from the Fellowship Office, Academy-Research Council, 2101 Constitution Avenue, Washington 25, D. C.

RECORD OF MEETINGS

| July | | August | |
|-------|--|--------|--|
| 7 | Agency Administrators of Building Research Advisory Board and Advisory Committee for Federal Construction Council, Joint Meeting | 3 | Committee on Loyalty in Relation to Government Support of Unclassified Research |
| 7-8 | Review Committee on WASHO Road Test, <i>Salt Lake City</i> | 10 | International Conference on Use of Antibiotics in Agriculture, Program Committee |
| 8-9 | Committee on Undersea Warfare | 15-18 | Panel on Columbium and Tantalum |
| 15 | Agricultural Board, Committee on Fats and Oils | 18 | Civil Defense Foods Advisory Committee, <i>Colorado Springs, Colo.</i> |
| 20 | Highway Research Board, Executive Committee, <i>San Francisco</i> | 19 | Agricultural Research Institute, Projects and Proposals Committee, <i>Midland, Mich.</i> |
| | Committee on Ship Steel, Project Advisory Committee on Semi-killed Steels over 1 Inch in Thickness | | Biology Council, Subcommittee on Publications, <i>Douglas Lake, Mich.</i> |
| 21 | Subcommittee on Container Research, <i>San Antonio, Tex.</i> | | Committee on the Preservation of Indigenous Strains of Maize, Executive Committee |
| | National Research Council Conference on Science and Mathematics Teaching, <i>New York City</i> | 23 | Federal Construction Council, Task Group on Building Electrical Loads |
| 22 | Panel on Underwater Swimmers | 24 | Ad hoc Committee on Highway Shoulders |
| 23 | Subcommittee on Nuclear Constants | 25-26 | Committee on Frost Heave and Frost Action in Soil, <i>Corbin, Ky.</i> |
| 25-31 | Biology Council, Subcommittee on College Education, <i>Bar Harbor, Me.</i> | 30 | Committee on Disaster Studies |
| 28-29 | Civil Defense Foods Advisory Committee, <i>Buffalo, N.Y.</i> | | Conference on Germ-free Animals |

NEW PUBLICATIONS

All publications listed may be seen in the Library. Academy-Research Council publications may be ordered through the Publications Office; others may be obtained from the publisher indicated.

- Atoll Research Bulletin*. Nos. 41-46 [in one volume]. Washington, National Academy of Sciences-National Research Council, Pacific Science Board, Aug. 1955. [100] p., illus.
- Castleman, Benjamin. *Tumors of the Thymus Gland*. Washington, Armed Forces Institute of Pathology, 1955. (*Atlas of Tumor Pathology*. Section V, Fascicle 19.) 82 p., illus. \$1.00.
- Clays and Clay Minerals. Proceedings of the Second National Conference on Clays and Clay Minerals*, University of Missouri, Columbia, Missouri, October 15-17, 1953. Washington, 1954. (National Academy of Sciences-National Research Council. Publication 327.) 498 p., illus. \$4.00.
- Conference on Electrical Insulation. *Annual Report*, 1954. Washington, National Academy of Sciences-National Research Council, Division of Engineering and Industrial Research, 1955. (National Academy of Sciences-National Research Council. Publication 368.) 67 p., illus. \$3.00.
- Johnson, Frank H., ed. *The Luminescence of Biological Systems. Proceedings of the Conference on Luminescence March 28-April 2, 1954, Sponsored by the Committee on Photobiology of the National Academy of Sciences-National Research Council and Supported by the National Science Foundation*. Washington, American Association for the Advancement of Science, 1955. 452 p., illus. \$6.00 AAAS members; \$7.00 others.
- Kaufert, Frank H., and Cummings, William H. *Forestry and Related Research in North America*. Washington, Society of American Foresters, 1955. 280 p. \$5.00. (A publication of the Forestry Research Project Steering Committee of the Society of American Foresters and the National Research Council.)
- Levin, David R. *Parking Requirements in Zoning Ordinances, A Supplement to Bulletin 24*. Washington, 1955. (National Academy of Sciences-National Research Council. Publication 347. Highway Research Board Bulletin 99.) 55 p. \$0.75.

Manpower Needs in Highway Engineering. Washington, 1955. (National Academy of Sciences-National Research Council. Publication 357. Highway Research Board Bulletin 106.) 30 p. \$0.60.

Pacific Science Board. *Eighth Annual Report* . . . 1954. Washington, National Academy of Sciences-National Research Council, [1955]. 61 p.

Palmer, Archie M. *Supplement to University Patent Policies and Practices.* Washington, 1955. (National Academy of Sciences-National Research Council. Publication 376.) 93 p. \$1.50.

Patt, Harvey M., ed. *Basic Mechanisms in Radiobiology. III. Biochemical Aspects.* Washington, National Academy of Sciences-National Research Council, Committee on Nuclear Science, Subcommittee on Radiobiology, 1954. (National Academy of Sciences-National Research Council. Publication 367. Nuclear Science Series Report Number 17.) 158 p. \$1.50.

Plant Regulators, Data from Preliminary Screening Tests . . . Washington, National Academy of Sciences-National Research Council, Chemical-Biological Coordination Center, June 1955. (National Academy of Sciences-National Research Council. Publication 384. CBCC Positive Data Series No. 2, 3, 4, and 5.) Four pamphlets, separately paged. Mimeographed.

Shopper Attitudes. A Supplement to Special Report 11, "Parking as a Factor in Business." Washington, 1955. (National Academy of Sciences-National Research Council. Publication 273a. Highway Research Board Special Report 11-A.) 71 p., illus. \$2.25.

Summary of Programs and Recommendations Relating to the Improvement of Teaching of Secondary School Science and Mathematics. Washington, National Academy of Sciences-National Research Council, Division of Physical Sciences, 1955. [79] p. Mimeographed.

U. S. Government Awards under the Fulbright and Smith-Mundt Acts. 1956-57, University Lecturing, Advanced Research. Washington, [Conference Board of Associated Research Councils, Committee on International Exchange of Persons], 1955. 51 p.

Vehicle Operation as Affected by Traffic Control and Highway Type. Washington, 1955. (National Academy of Sciences-National Research Council. Publication 358. Highway Research Board Bulletin 107.) 62 p., illus. \$0.90.

Notice of Academy Meetings

NATIONAL ACADEMY OF SCIENCES

Autumn Meeting, California Institute of Technology, November 2-4, 1955

Annual Meeting, Washington, D. C., April 23-25, 1956

NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL

Governing Board, Washington, D. C., October 9, 1955

Governing Board, Washington, D. C., December 4, 1955

Governing Board, Washington, D. C., February 12, 1956

Governing Board, Washington, D. C., April 22, 1956

Governing Board, Washington, D. C., June 17, 1956

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